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REPORT

ON THE

NAGPUR EXPERIMENTAL FARM

IN THE

CENTRAL PROVINCES

FOR THE YEAR 1888-89,

Ending 31st March 1889.

NAGPUR:

PRINTED AT THE CHIEF COMMISSIONER'S OFFICE PRESS.

1889.

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SUBJECT.
Government Experimental Farm Report for 1888-89.

FROM

J. P. GOODRIDGE, ESQ., C. S.,

OFFG. COMMR. OF SETTLEMENTS AND AGRICULTURE,

Central Provinces,

To

THE SECRETARY TO THE CHIEF COMMR.,

Central Provinces.

Dated Nagpur, the 8th October 1889.

SIR,

I have the honour to submit the annual Report on the working of the Government Experimental Farm at Nagpur during the year ending 31st March 1889.

The report has been written by the present Superintendent Mr. Mahaluxmivala who held charge of the farm throughout the year.

2. The salient characteristics of the monsoon of 1888 were its moderation, evenness, and early cessation. These conditions were favourable to most of the kharif, but were unsuited to the rabi crops.

Cotton, til and juar were sown, hoed and weeded at the right time, the weather having afforded frequent opportunities for these operations.

The light showers of August and the early cessation of the rains were also propitious to the cotton plants during the flowering and picking seasons, and saved the juar from rust which is often engendered by damp when the corn is forming in the ear. On the other hand, these conditions were unfavourable to the rabi crops, and owing to the absence of rain in September and October there was a lack of moisture at sowing time and the seed germinated badly.

This bad start was followed by the entire failure of the winter showers, and hot winds set in at the beginning of the hot weather.

3. A considerable quantity of upland Georgian cotton seed was distributed among cultivators in the Wardha District. The Deputy Commissioner reports that those who have used it consider it to be of a superior quality yielding more cleaned white cotton than the indigenous varieties. He is unable, however, to say what the outturn was, as the reports which were received are so discrepant that it is impossible to draw any inference from them. He has been requested to have a few experiments carefully made during the current season and the results compared with those obtained from the indigenous varieties grown under similar circumstances. The outturn of juar was also good, being 60 per cent better than in the preceding year. But the early cessation of the rains was unfavourable to the other kharif crops which are more dependent on the rainfall in the months of September and October and on winter showers. Wheat suffered a good deal but linseed not to the same extent, and as a matter of fact the year was more favourable to it than to any of the four preceding years during which the linseed crops were very poor. The average outturn of the linseed crop excluding manured plots was 238 lbs per acre as compared with 161 last year.

4. Experiments in green soiling, *i. e.*, in ploughing in green hemp, were continued during the year, but owing to the absence of rain in September and October the hemp remained unrotted in the ground and practically had no effect on the crop. But it was observed that the fields which had been fertilized in this manner in previous years were much enriched by the process.

Bone dust, saltpetre, farm-yard manure and poudrette were all tried. The results from bone dust and saltpetre compare favourably with those obtained from other manures.

5. The trial of the plan of embanking fields for rabi crops, so common and effective in the Northern Districts of the Province, and which was mentioned in last year's report, was continued during the year, but with no better success.

The unsatisfactory results obtained last year were, it was thought, due to the fields being uneven and not properly embanked These defects were remedied, but with no improvement in results. This may probably be ascribed in a great measure to the ingredients and consistency of the kanhar soil of the Nagpur District, but it may also be due to the time at which the bank was cut and to the treatment which the field received preparatory to sowing. The draining operation was apparently too long delayed, and the consequence was that the fields did not become fit for ploughing till late in the season. This circumstance, taken in connection with the absence of rain in September and October and again at Christmas, would I think account for the small yield of the embanked fields which had been sown late.

Accurate information will be obtained this year as to the precise time for completing the operations preparatory to sowing the seed, and the experiment will be continued till it is plain that the kanhar or black soil of the Nagpur country cannot in this respect be treated in the same manner as the kabar or black soil of the Narbada valley.

6. A trial was made of the cheap Iron Cane Mill of Messrs. Rogers of Saharanpur and the results obtained, when compared with those of the Bihea Mill, are reported to be favourable. A strong cheap iron mill is much needed in these Provinces. Mills of this kind which have hitherto been available are beyond the means of ordinary cultivators, and the people seem unable or unwilling to unite for the purpose of purchasing what is to them an expensive article and beyond the means of one person. Moreover the wooden mill now used is supplied by the village carpenter who must be supported in any case, so that practically the cultivators get their mills for little or nothing, and as ordinarily each cultivator makes only a small quantity of gur, it does not seem to him to be worth while to spend Rs. 150 on a mill to make a few rupees worth of gur. It is therefore only a cheap iron mill that will induce him to abandon the use of the ineffective "Kohlu."

7. The sale of improved agricultural implements is still exceedingly small. Intelligent practical farmers to whom these implements have been shown on several occasions, admit the advantages claimed for them, but urge that they are unsuited to this country. The Swedish plough for example goes a little deeper than the plough in ordinary use in the Nagpur District and also inverts the soil which the country plough does not. But then it needs much stronger bullocks to work it; and even in the Nagpur country, where the cattle are more robust and better fed than in most districts of the Province, they are said to be not strong enough to pull it through stiff clays.

8. The expenditure on the farm amounted to Rs. 5,930-6-0 of which Rs. 2,185-12-1 were covered by receipts. The net cost of the institution has therefore been only Rs. 3,744-9-11, which is less by Rs. 2,019-6-1 than the estimate, and less by Rs. 1,943-2-8 than the net cost of the institution last year.

9. A special report has this year been submitted on the course of instruction which has been given in farm management and in practical agriculture in connection with the Farm, and which was mentioned in last year's review; but it may be mentioned here that considerable progress has been made during the year. The class had an average strength of 25 throughout the year. The students are trained in all farm operations and at the same time receive theoretical instruction in Agriculture, Chemistry and Botany. They learn field surveying and work in the laboratory at the chemical analysis of soils. Each pupil has a plot of his own in which he raises the principal crops grown in the district.

With the aid of the Assistant Settlement Officer (an officer of the Survey of India Department) and the Professors of the Hislop College at Nagpur, an examination was held in March last. Of the 20 students examined, 17 passed and have now commenced their second year's course of study. The Inspector General of Education considers the progress which has been made very satisfactory, and writes:—

"The general result reflects credit on the Principal and his assistants. "The class may be said to have passed beyond the experimnetal stage and to "have obtained an assured position among the educational institutions of these "Provinces."

I have the honour to be,

Sir,

Your most obedient Servant,

J. P. GOODRIDGE,

Offg. Commr. of Settlements and Agriculture,

Central Provinces.

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(1) Report by Superintendent on the working of the Experimental Farm during 1888-89.

(2) Comparative record of experiments made on the Farm during the year.

(3) Statement showing the total area under experiment on the Farm during the year.

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SUBJECT.	FROM
Report on the Experimental Farm, Nagpur, for the year 1888-89.	THE SUPERINTENDENT, EXPERIMENTAL FARM, *Nagpur,*

To

J. P. GOODRIDGE, ESQ. C. S.,

OFFG. COMMISSIONER OF SETTLEMENTS AND AGRICULTURE,

Central Provinces.

Dated Nagpur, the 17th June 1889.

SIR,

I have the honour to submit the annual Report on the working of the Nagpur Experimental Farm during the year ending 31st March 1889.

A.—SEASON.

2. It will be noticed from the table below that the rainfall during the year was very deficient, being less by 13·72 inches than the average of the preceding 14 years:—

Month.		Year under report.	Average of 14 years preceding.	Month.		Year under report.	Average of 14 years preceding.
		Inches.	Inches.			Inches.	Inches.
April	1st half	...	0·13	October	1st half	...	1·86
	2nd half	0·06	0·21		2nd half	0·14	1·52
May	1st half	...	0·35	November	1st half	0·61	0·59
	2nd half	...	0·34		2nd half	0·74	0·26
June	1st half	3·95	3·49	December	1st half	0·04	0·13
	2nd half	5·88	4·97		2nd half	...	0·38
July	1st half	7·95	7·83	January	1st half	...	0·47
	2nd half	3·91	7·34		2nd half	...	0·18
August	1st half	3·25	7·08	February	1st half	...	0·12
	2nd half	4·55	4·14		2nd half	...	0·30
September	1st half	2·33	4·59	March	1st half	...	0·08
	2nd half	3·42	3·91		2nd half	0·01	0·29
				Grand Total ...		36·84	50·56

The kharif crops were sown in favourable weather, and as the season continued fair they made a good start. The deficiency of rain, however, during the latter part of the monsoon affected the yield of all these crops except juar and cotton which turned out fairly well. To the rabi crops on the other hand, the total absence of rain at sowing time combined with the deficient fall in October and again from December to the end of the year, were most unfavourable and the outturn was a very poor one.

B.—Field Experiments.

(a) Kharif crops.

3. The usual experiments to ascertain the effect of different kinds of manures on Upland Georgian cotton were made. Poudrette, cattle-dung and bone dust were tried and the results of three series of experiments are shown below. Dung and poudrette both gave good results, while bone dust seems to have very little effect on this crop—

Serial number of experiment.	No. of field.	Area of field.	Treatment in previous year.		Special treatment in year under report.	No. of hand weedings.	No. of bullock hoeings.	Outturn per acre of cleaned cotton.
			Manure.	Crop.				
		Acres.						lbs.
I.	29	0·82	Dung.	Cotton.	Dung.	2	3	178
	33E	0·37	Bone dust.	do.	*Nil.*	2	4	137
	33W	0·37	do.	do.	Bone dust.	2	4	121
	36	0·55	*Nil*	do.	*Nil.*	2	4	129
II.	18E	0·44	do.	Wheat.	Dung.	3	4	134
	18W	0·44	do.	do.	Bone dust.	3	4	102
III.	59E	0·85	do.	Linseed.	*Nil*	1	2	107
	59W	0·85	do.	do.	Poudrette.	1	2	157

4. The effect of green soiling on cotton is shown in the following table. In one case green soiling gave nearly the same outturn as the unmanured plot, while in the other the result was in favour of green soiling :—

Serial number of Experiment.	No. of field.	Area of field.	Treatment in previous year.		Special treatment in year under report.	No. of hand weedings.	No. of bullock hoeings.	Outturn per acre of cleaned cotton.
			Manure.	Crop.				
		Acres.						lbs.
I.	14E	0·51	Hemp.	Wheat.	*Nil.*	3	4	118
	14W	0·51	*Nil.*	do.	do.	3	4	123
II.	38N	0 15	Hemp.	do.	do.	2	3	92
	38S	0·15	*Nil.*	do.	do.	2	3	62

5. 550 lbs. of Upland Georgian cotton seed were sent to Wardha for distribution to cultivators in that district. The reports of the Tahsildars through whom the seed was distributed give no reliable information regarding the yield, &c., but the Deputy Commissioner in forwarding these reports writes that "they are unanimous in saying that the cotton is whiter than the ordinary country kind and yields a larger proportion of cleaned cotton."

6. One of the series (B) of the permanent experimental plots was sown with til. The results are tabulated below. It may be remarked that the hemp ploughed in did not decompose in the soil owing to the want of rain :—

No. plot.	Manure and rate per acre.	Out-turn of seed per acre.	Increase per cent on produce of unmanured plot.	Remarks.
		lbs.		
I.	Saltpetre 240 lbs.	790	+80	
II.	Bone dust 360 „	880	+100	
III.	Saltpetre 240 „ and bone dust 360 lbs. ...	640	+45	
IV.	Cattle dung 160 maunds	560	+27	
V.	Cattle dung 160 maunds and bone dust 360 lbs....	670	+52	
VI.	Ashes of 160 maunds cattle dung ...	520	+18	
VII.	*Nil.*	440	.....	
VIII.	Crop of hemp ploughed in green ...	290	—34	

7. Field No. 69 and a part of No. 67, measuring in all 1·56 acres, were sown with sorgho for the purpose of making sugar. The out-turn was at the rate of 3,781 lbs. of stalks per acre, which being pressed in the Bihea Sugarcane mill yielded 1,922 lbs. of juice. The juice was boiled down in Cook's Evaporator and 214 lbs. of good syrup (rab) were obtained. The syrup was allowed to crystallize in earthen gurrahs, but the crystals being separated from the treacle by the hand centrifugal, the weight of the sugar obtained only amounted to 5 lbs. The chief difficulty in obtaining sugar from sorgho is, that the juice has a tendency to become rapidly sour, and if this acidity is not checked in time it is difficult to obtain good sugar.

8. The area and out-turn per acre of the remaining kharif crops are shown below. Except juar all, as has already been mentioned, suffered from the want of rain:—

Crop.	Area on which grown in year under report.	Kind.	Average out-turn per acre in	
			1887.	1888.
	Acres.		lbs.	lbs.
Juar (Holcus sorghum) for grain ...	0·95	Grain ...	314	503
		Stalks ...	2,632	3,688
Juar do. for fodder. ...	6·36	Green fodder..	1,702	6,123
Guinea grass (Panicum jumentorenm) ...	1·49	do. ...	2,387	999
Tur (Cajanus flavus) ...	4·05	Grain ..	719	490
Mung (Phaseolus mungo) ...	0·24	do. ...	450	179
Popat white (Lablab vulgaris) ...	0 13	do. ...	*497	300
Japan pea (Glycine hispida) ...	0·55	do. ...	69	67
Til (Sesamum indicum) ..	0·67	Seed ...	...	†504
Castor (Ricinus communis) ...	2·08	do. ...	380	82
Chillies (Capsicum annum) ...	0·29	Dry chillies...	270	114

* Black popat. † Excluding manure plots.

9. Juar and guinea grass were ensilaged during the year under report. Four ordinary pits were made in the ground. One of these was filled with guinea grass, while in the remaining three stalks of green juar cut while in flower were placed. The dimensions of the four pits were 10'×9' ×4'-3", 11'×9'-6"×5', 21'-3"×16 -3"×3'-8" and 15'×10'×4'-5" respectively. The quantity of guinea grass put in the first of these pits was 5,013 lbs. and the silage taken out amounted to 4,461 lbs. after exclusion of the damaged portion. The remaining three pits were, as has already been noticed, filled with juar stalks, of which 7,620 lbs., 16,097 lbs. and 14,276 lbs. were put in, yielding 5,214 lbs., 11,536 lbs. and 6,160 lbs. respectively of good silage. The cost of making the pits, cutting the crops, carriage, filling in &c., amounted to 2, annas per maund of good silage.

(b)—Rabi crops.

10. Linseed and wheat were sown in embanked fields.

The following table shows how poor the out-turn was in most of these fields:—

Number of field.	Area.	Crop.	Special treatment.	Out-turn of grain per acre.	Remarks.
	Acres.			lbs.	
41	1·22	Linseed ..	Embanked ...	60·45	The crop failed totally on nearly one-third of the area, and the remaining crop also was poor.
42	1·23		Not embanked...	187·60	
43	1·30	Do. ...	Embanked ...	219·23	
44	1·22	do. ..	Not embanked..	299·18	
45	1·21	do. ...	Embanked ...	345·45	
62	1·62	do. ...	do. ...	123·14	
3	0·87	Wheat ...	do. ...	36·50	
34	1·22	do. ..	do. ...	79·71	Manured with dung.
49	2·42	do. ...	do. ...	43·09	
50	2·22	do. ...	do. ...	62·38	
64	1·26	do. ...	do. ...	0·79	
66	1·12	do. ...	do. ...	1·56	

11 The hemp sown for green soiling this year made a very robust growth, and was in many places about 5 feet high when ploughed in. This large mass of vegetable matter remained, owing to the subsequent want of rain, undecomposed in the soil, and the results shown below cannot therefore be considered as quite normal:—

Number of field.	Area.	Treatment in preceding year.		Crop.	Special treatment.	Outturn of grain per acre.	Remarks.
		Manure.	Crop.				
	Acres.					lbs.	
37 E.	0·40	Hemp ...	Linseed ...	Linseed ...	Hemp ploughed in	415	
37 W.	0·49	*Nil* ...	do. ...	do. ...	do. ...	232	
46	1·10	Hemp ...	Wheat ..	Wheat ...	do. ...	204	
47	1·44	*Nil* ...	do. ...	do. ...	*Nil* ...	113	
21	0·76	Hemp ...	Linseed ...	do. ...	Hemp ploughed in.	165	
61	1·05	*Nil* ...	Tur ..	Linseed ...	do. ...	120	
63	1·02	do. ...	do. ...	Wheat ...	do. ...	...	Failed to germinate.
65	0·93	do. ...	do. ...	do. ...	do. ..	...	do.

12. The following experiments show the value of dung and bone dust in improving the out-turn in the case of linseed and wheat. Both of them have given good results:—

Serial number of experiment.	Number of field.	Area.	Treatment in preceding year.		Crop.	Special treatment.	Outturn of grain per acre.	Remarks.
			Manure.	Crop.				
		Acres.					lbs.	
1	23 E.	0·69	*Nil* ...	Wheat ..	Wheat ...	Bone dust ...	195	
	23 W.	0·69	Bone dust..	do. ...	do. ...	*Nil* ...	178	
2	12S A.	0·28	do. ...	Linseed ..	do. ...	Bone dust ...	215	
	12S B.	0·29	*Nil* ...	do. ..	do. ...	*Nil* ...	200	
3	39 N.	0·37	do. ...	Wheat ...	Linseed...	Bone dust ...	454	
	39 S.	0·21	do. ...	do. ..	do. ...	Dung ...	690	
4	17	0·49	Dung ...	Linseed ...	Wheat..	do. ...	250	
	25	0·48	Bone dust...	do. ...	do. ...	Bone dust ...	379	
5	55	1·53	*Nil* ...	Cotton ...	do. ...	Dung ...	408	
	57	1·25	do. ...	do. ...	do. ...	Bone dust ...	200	

13. Field No. 40 which was manured with poudrette in 1883-84, has since then been giving a very good out-turn without any manure. It was again sown with linseed this year, and without any manure, and yielded at the rate of 776 lbs of seed per acre, the largest out-turn ever produced on the Farm from manured or unmanured fields.

14. Of the three varieties of wheat grown on the Farm, *viz.* pissi (soft white), haura (hard white Nagpur), and kathia (hard red), haura seems this year to have suffered least and pissi most from the deficiency of moisture in the soil.

15. Of the three series of permanent experimental plots, series A and C were sown with haura wheat and the results are tabulated below as usual, each series being taken separately as well as both together.

TABLE I.—SERIES A.

Number of plot.	Manure applied with details of rate per acre.	Outturn of Grain per acre.					Outturn of Straw per acre.					Average outturn per acre.		Percentage of increase over produce of unmanured plot.			
														Grain.		Straw.	
		1884-85.	1885-86.	1886-87.	1887-88.	1888-89.	1884-85.	1885-86.	1886-87.	1887-88.	1888-89.	Grain.	Straw.	1888-89.	Average of 5 years.	1888-89.	Average of 4 years.
		lbs.	lbs.	lbs.	lbs.	lbs.		lbs.	lbs.	lbs.	lbs.	lbs.	lbs.				
I	Saltpetre, 240 lbs. ...	1,555	990	1,610	1,470	610		2,440	2,360	1,640	770	1,24	1,802	+13	+50	+18	+46
II	Bone dust, 360 lbs. ...	1,067	635	1,340	948	695		2,000	1,830	990	880	937	1,425	+32	+12	+35	+16
III	Saltpetre 240 lbs, and bone dust 360 lbs ...	1,320	653	1,580	1,565	545		2,210	2,450	1,770	655	1,133	1,771	+4	+36	+1	+44
IV	Cattle dung, 160 maunds ...	1,003	515	1,550	1,138	350		1,740	2,390	1,260	490	911	1,470	—33	+9	+25	+19
V	Cattle dung 160 maunds, and bone dust 360 lbs	1,122	928	1,400	1,065	405		1,800	1,890	1,220	450	984	1,340	—23	+18	+31	+9
VI	Ashes of 160 maunds, cattle dung ...	1,394	855	1,350	830	600		2,250	2,120	1,060	930	1,006	1,590	+14	+21	+43	+29
VII	No manure ...	1,055	763	1,060	760	525		1,600	17 20	960	650	833	1,232	...	...	...	...
VIII	Crop of hemp ploughed in green ...	940	250	1,480	803	275		1,220	1,740	960	350	740	1,067	—46	+11	—46	—46

Not recorded.

TABLE II.—Series C.

Number of plot.	Manure applied with details of rate per acre.	Outturn of Grain per acre.					Outturn of Straw per acre.					Average outturn per acre.		Percentage of increase over produce of unmanured plot.			
														Grain.		Straw.	
		1884-85.	1885-86	1886-87.	1887-88.	1888-89.	1884-85.	1885-86.	1886-87.	1887-88.	1888-89.	Grain	Straw.	1888-89.	Average of 5 years.	1888-89.	Average of 4 years.
		lbs.	lbs.	lbs.	lbs.	lbs.		lbs.	lbs.	lbs.	lbs.	lbs.	lbs.				
I	Saltpetre, 240 lbs. ...	1,035	853	1,120	1,120	460		1,610	1,610	1,260	570	918	1,262	+136	+50	+111	+34
II	Bone dust, 360 lbs. ...	942	1,023	1,120	855	375		1,660	1,660	960	570	863	1,212	+92	+41	+111	+29
III	Saltpetre 240 lbs., and bone dust 360 lbs. ...	892	700	1,140	1,218	320		1,720	1,600	1,340	425	854	1,271	+64	+40	+57	+35
IV	Cattle dung, 160 maunds ...	700	915	990	710	135		1,740	1,370	860	200	690	1,042	—31	+13	—26	+11
V	Cattle dung 160 maunds, and bone dust 360 lbs	720	723	940	820	395	Not recorded.	1,180	1,330	890	630	720	1,007	+103	+18	+133	+7
VI	Ashes of 160 maunds dung ...	939	848	970	853	385		1,460	1,330	880	450	799	1,030	+97	+31	+67	+10
VII	No manure ...	640	700	780	733	195		1,470	1,200	820	270	610	940	...	...	...	...
VIII	Crop of hemp ploughed in green ...	915	228	1,208	893	255		990	1,643	960	410	700	1,001	+31	+15	+52	+6

TABLE III.—Average of Series A. and C.

Number of plot.	Manure applied with details of rate per acre.	Outturn of Grain per acre.					Outturn of Straw per acre.					Average outturn per acre.		Percentage of increase over produce of unmanured plot.			
														Grain.		Straw.	
		1884-85.	1885-86.	1886-87.	1887-88.	1888-89.	1884-85.	1885-86.	1886-87.	1887-88.	1888-89.	Grain.	Straw.	1888-89.	Average of 5 years.	1888-89.	Average of 4 years
		lbs.	lbs.	lbs.	lbs.	lbs.		lbs.	lbs.	lbs.	lbs.	lbs.	lbs.				
I	Saltpetre, 240 lbs. ...	1,295	922	1,365	1,295	535		2,025	1,985	1,450	670	1,082	1,532	+49	+50	+46	+46
II	Bone dust, 360 lbs. ...	1,005	829	1,230	901	535		1,830	1,745	975	725	900	1,319	+49	+25	+58	+25
III	Saltpetre 240 lbs., and bone dust 360 lbs. ...	1,106	677	1,360	1,391	432		1,965	2,025	1,555	540	993	1,521	+20	+38	+17	+45
IV	Cattle dung, 160 maunds ...	852	715	1,270	924	242		1,740	1,880	1,060	345	801	1,256	—33	+11	+25	+19
V	Cattle dung 160 maunds, and bone dust 360 lbs.	921	826	1,170	942	400	Not recorded.	1,490	1,610	1,055	540	852	1,174	+11	+19	+17	+12
VI	Ashes of 160 maunds dung ..	1,167	852	1,160	841	492		1,855	1,725	970	690	902	1,310	+37	+25	+50	+25
VII	No manure ...	849	732	920	746	360		1,400	1,460	890	460	721	1,052				
VIII	Crop of hemp ploughed in green ..	928	239	1,319	848	265		1,105	1,692	960	380	720	1,034	—26	—01	—17	—2

While bone dust, dung ashes and saltpetre have given good results, cattle-dung does not seem to be very efficacious, and hemp has given the worst result. The effect of the deficient rainfall is noticeable throughout.

16. The following experiments were made with a view of ascertaining the proper time when dung should be applied to the wheat crop in embanked and unembanked fields. In unembanked fields manure applied before the rains gave better results than when applied in August. :—

No. of field	Area.	Special treatment.	Out turn of grain per acre.	Remarks
	Acres.		lbs.	
26S	0·87	Manured with dung in August ...	128	
30	1·00	Manured in May with dung .	157	
34	1·22	Do. ...	80	embanked.

VILLE SERIES OF PLOTS.

Number of plot	Manure applied with rate per acre	Outturn of Grain per acre. 1883-84	1884-85	1885-86	1886-87	1887-88	Outturn of Straw per acre. 1883-84	1884-85	1885-86	1886-87.	1887-88	Average outturn per acre. Grain	Straw	Treatment in year under report	Outturn per acre. Grain	Straw	Percentage of increase over produce of unmanured plot. Grain. 1888-89	Grain. Average of five years	Straw. 1888-89	Straw. Average of four years.
		lbs	lbs	lbs	lbs	lbs	lbs		lbs	lbs.	lbs	lbs.	lbs		lbs.	lbs				
I	Ammonic chloride ... 140 Calcic superphosphate 180 Potassic sulphate ... 90 Calcic sulphate ... 100	2,000	1,380	940	2,080	1,170	2,360	Not recorded	3,770	3,360	1,200	1,514	2,672	As in VI, less calcic sulphate	510	980	+17	+46	+29	+38
II	Do less calcic superphosphate	1,780	1,465	1,130	2,081	1,280	1,840		3,640	3,458	1,280	1,537	2,554	As in VI, less potassic sulphate ..	630	740	—9	+43	—3	+32
III	As in I; less ammonic chloride ...	1,170	920	1,040	1,754	1,110	1,640		3,160	3,525	1,220	1,198	2,386	No manure	690	760	...	+15	..	+23
IV	No manure	780	735	695	2,000	985	820		2,680	3,200	1,040	1,039	1,936	As in VI, less ammonic chloride .	690	940	Nil	...	+24	...
V	As in I; less potassic sulphate	1,460	1,270	723	2,075	820	1,800		2,680	2,700	940	1,284	2,030	As in VI, less calcic superphosphate ..	560	740	—19	+24	—3	+5
VI	As in I, less calcic sulphate	1,560	1,320	1,065	1,360	760	1,800		2,460	1,900	960	1,213	1,780	lbs Ammonic chloride .. 140 Calcic superphosphate 180 Potassic sulphate ... 90 Calcic sulphate ... 100	590	980	—14	+17	+29	—8

17 The Ville Series of plots were left unmanured last year, while in the present year the usual manures were applied but in the reversed order. The crop grown on them was Indra wheat. The usual table is given below :—

The average result of the preceding year's experiments showed that the omission of Ammonia reduced the yield a good deal, but that the crops did not apparently suffer so much from the omission of potash, and in a less degree of superphosphate. But the results of the present year are, however, very discrepant, and owing to the plots having received different treatment from that adopted in former years, no reliable conclusion can be drawn from the resulting out-turn. Three or four years must be allowed to elapse before this changed treatment can show its true effect.

18. A small plot of ground is sown every year with selected pedigree wheat. It was manured with bone dust during the year under report and was twice irrigated. The result is shown below :—

Variety of wheat.	Area.	Manured or unmanured.	Out-turn of grain per acre.	Remarks.
	Acres.		lbs.	
Haura (hard white Nagpur).	0·15	Manured with bone dust.	1,263	
Pissi (soft white) ...	0·04	Do.	919	

19. An experiment was made in order to try. bisulphide of carbon as an application for the prevention of the attacks of the weevil upon corn and grain, as recommended by Professor A. H. Church. Four ordinary dholas made of tur stalks and plastered over with a mixture of earth and cow dung were made, each capable of containing 2½ maunds of wheat. The quantity of carbon bisulphide used was at the rate of 1 oz. to 100 lbs. of wheat. A ball of tow or cotton was wetted with the bisulphide and put into a hollow bamboo cylinder open at both ends. This was then plunged into the middle of the vessel containing the grain and the vessel covered up. The following table shows the result of the experiment. The results would have been more satisfactory if the iron cylinders specially prepared for use in the bisulphide process had been used. But they are very costly and are thus quite unsuited to the requirements of the Indian cultivator. Further trials will however be made next year :—

No of Dhola.	Quantity of wheat stored	Treatment	When stored.	When opened	Result
	Mds				
1	2½	Treated with bisulphide of carbon	May 16th 1888	Twice during the rains on 31st July 1888 and 30th September 1888 and finally in October	18 per cent of the grain weeviled
2	2½	*Nil*	Do	Do	25 per cent do
3	2½	Treated with bisulphide of carbon.	Do	Not opened till October	12 per cent do
4	2½	*Nil*	Do	Do.	16 per cent do

20. The table below shows the average outturn of this year's rabi crops compared with those of preceding years. The reason why wheat averages are so poor is that some very poor fields which are much scoured by rain were embanked last year and were sown with wheat to see the effect of embankments in this part of the country :—

Crop.	Average outturn in					Area on which sown in year under report.	Outturn of grain per acre.			Remarks.
	1883-84.	1884-85.	1885-86.	1886-87.	1887-88.		Maximum.	Minimum.	Average.	
	lbs.	lbs.	lbs.	lbs.	lbs.	Acres.	lbs.	lbs.	lbs.	
Wheat (hard red) ...	*Nil*		469	615	407	1·99	710	18	163	
Do. (soft white) ...	658	379	426	423	546	2·73	99	27	70	
Do. (Nagpur haura).		580	454	589	466	20·67	810	36	191	Including manure plots.
		423	409	520	389	18·77	379	36	165	Excluding manure plots.
Linseed ...	428	315	166	188	161	10·62	776	60	238	
Gram ...	Not recorded	185	257	197	204	3·35	446	432	434	

21. A fifth part of an acre was planted with sugarcane during the year under report, but it was much damaged by white ants. It yielded at the rate of 10,680 lbs of cane per acre. The juice obtained from this was 6,285 lbs, which on being boiled yielded 700 lbs of rab or syrup. The reduction of the syrup resulted in 52·5 lbs of brown sugar and 600 lbs of treacle.

C.—Experiments with improved Agricultural Machinery.

22. The following new implements were tried on the Farm during the year under report, *viz.*, Roger's Saharanpur steel sugarcane Mill and Hayward and Tyler's hand pumps for drawing water for drinking and household purposes from wells from 25 to 60 feet deep. The Roger's Mill is a cheap, efficient and very strong mill. It was tried side by side with the Bihea three-roller mill, and the result shown below is not unfavourable to the Roger's Mill.

	Cost at Nagpur.			Labour employed.	Quantity of canes crushed per hour.	Quantity of juice obtained.
	Price.	Freight.	Total.			
	Rs. a. p.	Rs. a. p.	Rs. a. p.		lbs.	lbs.
Roger's Saharanpur steel sugarcane Mill ...	95 0 0	11 1 0	106 1 0	2 men and 2 bullocks.	200	122
Bihea three-roller sugarcane Mill...	128 0 0	18 2 0	146 2 0	Do.	211	137

It may be remarked also that the wooden body of the Bihea Mill is liable to give way sometimes when the canes are hard and thick, while there is less liability to such accidents in the case of the Roger's Mill, the body of which is made of iron. The cost of the Roger's Mill is also less than that of the Bihea Mill, and this is of course a great consideration in this country. The hand pumps are useful for drawing water from wells for drinking and household purposes. They can be easily worked by one person and give a fair discharge of water. As soon as one of these pumps is fixed, the well can be covered up so as to prevent the pollution of its water

23. The work of introducing improved implements through private agency has not proved very successful. Nineteen ploughs and one winnower were sold during the year under report. The business might prove successful if it could be entrusted to a person fully interested in the work and willing to devote his whole time to it, but the present agent has not fulfilled the expectations that were formed of him.

D.—Agricultural training.

24. The utility of the Farm has now been increased by its being made a training ground for students studying in the new Agricultural class opened on June 1st 1888 by order of the Chief Commissioner. The class is placed in my charge. The students not only watch and receive explanation of the various operations going on on the Farm, but they have also pieces of land allotted to them on which they raise their own crops and prepare them for the market, all the operations being done by the students themselves without any outside assistance. This system it is hoped will secure a thoroughly practical training for each student. The class has been so far a success, but as a separate report on its management has already been submitted, I do not think it necessary to refer to it in any detail here.

E.—Sewage Farm.

25. The Sewage Farm has continued to work well. The total area leased out during the year under report was 20 acres. The rent and water rate were increased from Rs. 15 per acre and three annas per each acre irrigation, to Rs. 17-8-0 and 8 annas respectively.

F.—Financial result.

26. The actual receipts and expenditure of the year under report are compared below with the budget estimates:—

	Expenditure.			Receipts.	Net cost
	Salaries.	Contingencies.	Total.		
	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.
Budget ...	2,964 0 0	4,300 0 0	7,264 0 0	1,500 0 0	5,764 0 0
Actual ...	2,730 12 11	2,199 9 1	5,930 6 0	2,185 12 1	3,744 9 11

27. The usual comparative record of experiments is appended.

I have the honour to be,

Sir,

Your most obedient Servant,

C. D. MAHALUXMIVALA,

Superintendent, Experimental Farm,

Nagpur.

Comparative record of experiments made on the Nagpur Experimental Farm, Central Provinces, during the year ending 31st March 1889 (prescribed by Circular No. 143 A., dated the 28th December 1885.)

Serial No.	Object of experiment.	Points in which treatment of experimental area differed from ordinary treatment.	Reference to Farm numbers of fields under experiment.	Crop grown.	Result of ordinary (or native) treatment per acre.	Result of treatment experimented with per acre.	Percentage of increase (+) or decrease (—) in produce resulting from experimental treatment.	Remarks.
1	2	3	4	5	6	7	8	9
1	To test the value of cattle dung as a manure.	Dung applied at the rate of 114 cwt per acre against no manure.	29 and 36.	Cotton.	Lint 129 lbs. (on adjacent field).	Lint 178 lbs. ...	+38	
*2	As above ...	As above ...	(A and C) VII and (A and C) IV.	Wheat.	Grain 360 lbs. ... Straw 460 lbs. (average of two experimental plots) ...	Grain 242 lbs. ... Straw 345 lbs. (average of two experimental plots) ...	—33 —25	Unreliable as irregular germination of the crop on account of want of rain.
*3	As above ..	As above ..	B VII and B IV.	Til.	Grain 440 lbs. ...	Grain 560 lbs. ...	+27	
*4	To test the value of bone dust as a manure	Bone dust applied at the rate of 360 lbs. per acre against no manure.	(A and C) VII and (A and C) II.	Wheat.	Grain 360 lbs. ... Straw 460 lbs. (average of two experimental plots.)	Grain 535 lbs. ... Straw 725 lbs. (average of two experimental plots. ...	+49 +58	
*5	As above ...	As above ..	B VII and B II.	Til.	Grain 440 lbs. ...	Grain 880 lbs. ...	+100	
6	As above ..	As above ..	33 W and 36.	Cotton.	Lint 129 lbs. (on adjacent field.)	Lint 121 lbs. ...	—6	The manure has been washed away by rain.
7	As above ...	As above ...	23 E and 23 W.	Wheat.	Grain 178 lbs. (on adjacent land.)	Grain 195 lbs. ...	+10	
8	As above ...	As above ..	12 S A and 12 S B.	do.	Grain 200 lbs. (on adjacent land.)	Grain 215 lbs. ..	+7	

Serial No.	Object of experiment.	Points in which treatment of experimental area differed from ordinary treatment.	Reference to Farm numbers to fields under experiment.	Crop grown.	Result of ordinary (or native) treatment per acre	Result of treatment experimented with per acre.	Percentage of increase (+) or decrease (—) in produce resulting from experimental treatment.	Remarks.
1	2	3	4	5	6	7	8	9
9	To test the value of bone dust in the second year after application.	As above in 1887; unmanured in year under report.	33 E and 36.	Cotton.	Lint 129 lbs. (on adjacent field.)	Lint 137 lbs. ...	+6	
10	To test the value of poudrette as a manure.	Poudrette applied at the rate of 143 cwt. per acre against no manure.	59 E and 59 W.	do.	Lint 107 lbs. (on adjacent land.)	Lint 157 lbs. ..	+47	
11	To test the comparative values of bone dust and dung.	Bone dust applied at the rate of 360 lbs. per acre against an application of dung at the rate of 114 cwt. per acre.	18 E and 18 W.	do.	Lint 134 lbs. (on field manured with dung.)	Lint 102 lbs. ...	—24	
12	As above ...	As above ...	39 N and 39 S.	Linseed.	Grain 690 lbs. (on field manured with dung.)	Grain 454 lbs. ...	—34	
13	To test the comparative values of bone dust and dung.	Bone dust applied at the rate of 360 lbs. per acre against an application of dung at the rate of 114 cwt per acre.	25 and 17.	Linseed.	Grain 259 lbs. (on field manured with dung.)	Grain 379 lbs. ...	+46	Unrealiable.
14	As above ...	As above ...	55 and 57.	do.	Grain 408 lbs. (on field manured with dung.)	Grain 200 lbs. ...	—51	
15	To test the utility of green soiling with hemp (crotalaria juncea) in previous year.	A crop of hemp ploughed in green in 1887, no manure in year under report.	14 E and 14 W.	Cotton.	Lint 123 lbs. (on adjacent land.)	Lint 118 lbs. ...	—4	Suffers from shade of the mango tree.
16	As above ...	As above ...	38 N and 38 S.	do.	Lint 62 lbs. (on adjacent land.)	Lint 92 lbs. ...	+48	

17	To test the utility of green soiling with hemp (crotalaria juncea) in previous year and in year under report.	A crop of hemp ploughed in green in 1887 and 1888, against ploughed in year under report.	37 E and 37 W	Linseed..	Grain 232 lbs. (on adjacent land.)	Grain 415 lbs. ...	+ 79	
18	To test the utility of green soiling with hemp (crotalaria juncea) in year under report.	A crop of hemp ploughed in green.	46 and 47	Wheat.	Grain 113 lbs. (on adjacent field).	Grain 204 lbs. ...	+81	
*19	To test the utility of green soiling with hemp (crotalaria juncea) in year under report.	A crop of hemp ploughed in green.	(A and C) VII and (A and C) VIII.	Wheat ...	Grain 360 lbs. Straw 460 lbs. (average of two experimental plots).	Grain 265 lbs. Straw 380lbs. (average of two experimental plots).	—26 —17	Unreliable as hemp did not decompose properly.
*20	As above ...	As above ...	B VII and B VIII.	Til ...	Grain 440 lbs. ...	Grain 290 lbs. ...	—34	Do.
21	To test the utility of embanking fields.	Land embanked into plots of one-fifth acre in size in place of being left open.	41 and 42 ..	Linseed ...	Grain 188 lbs. (on adjacent field).	Grain 60 lbs. ...	—68	
22	As above .	As above ...	43 and 44 ...	Do.	Grain 299 lbs. (on adjacent field).	Grain 219 lbs. ...	—27	
*23	To test the value of saltpetre as a manure.	Saltpetre applied at the rate of 240 lbs. per acre against no manure.	(A and C) VII and (A and C) I.	Wheat ...	Grain 360 lbs. Straw 460 lbs. (average of two experimental plots).	Grain 535 lbs. Straw 670 lbs. (average of two experimental plots).	+49 +46	
*24	To test the value of saltpetre as a manure.	Saltpetre applied at the rate of 240 lbs. per acre against no manure.	B VII and BI...	Til ..	Grain 440 lbs. ...	Grain 790 lbs. ...	+80	
*25	To test the value of saltpetre plus bone dust as a manure.	Saltpetre applied at the rate of 240 lbs. per acre plus bone dust at 360 lbs. per acre.	(A and C) VII and (A) and C III.	Wheat ...	Grain 360 lbs. Straw 460 lbs. (average of two experimental plots).	Grain 432 lbs. Straw 540 lbs. (average of two experimental plots).	+20 +17	

Serial No.	Object of experiment.	Points in which treatment of experimental area differed from ordinary treatment.	Reference to Farm numbers of fields under experiment.	Crop grown.	Result of ordinary (or native) treatment per acre	Result of treatment experimented with per acre.	Percentage of increase (+) or decrease (−) in produce resulting from experimental treatment.	Remarks.
1	2	3	4	5	6	7	8	9
*26	As above ..	As above ...	B VII and B III.	Til ...	Grain 440 lbs. ..	Grain 640 lbs. ...	+45	
*27	To test the value of cattle dung plus bone dust as a manure.	Cattle dung applied at the rate of 114 cwt per acre plus 360 lbs. bone dust per acre.	(A and C) VII and (A and C) V.	Wheat ...	Grain 360 lbs. Straw 460 lbs. (average of two experimental plots).	Grain 400 lbs. Straw 540 lbs. (average of two experimental plots.)	+11 +17	
*28	As above. ...	As above ...	B VII and B V	Til ...	Grain 440 lbs ..	Grain 670 lbs. ...	+52	
*29	To test the value of ashes of cattle dung as a manure.	Ashes of 114 cwt of cattle dung against no manure.	(A and C) VII and (A and C) VI	Wheat ...	Grain 360 lbs. Straw 460 lbs. (average of two experimental plots).	Grain 492 lbs. Straw 690 lbs. (average of two experimental plots).	−37 +50	
*30	As above ...	As above ..	B VII and B VI.	Til ..	Grain 440 lbs. ..	Grain 520 lbs. ...	+18	
*31	Soil analysis on the Ville system.	Ammonic choloride, calcic superphosphate, potassic sulphate and calcic sulphate (for proportions see paragraph 17 of report) against no manure.	Ville VI and III.	Wheat ..	Grain 690 lbs. ... Straw 760 lbs. ...	Grain 590 lbs. Straw 980 lbs.	−14 +29	
*32	As above ..	As in 31, omitting calcic superphosphate.	Ville V and III.	Do. ..	As above ..	Grain 560 lbs. Straw 740 lbs.	−19 −3	
*33	As above ...	As in 31, omitting ammonic chloride.	Ville IV and III	Do. ...	As above ...	Grain 690 lbs. Straw 940 lbs.	... +24	
*34	As above ..	As in 31, omitting potassic sulphate	Ville II and III.	Do. ...	As above ...	Grain 630 lbs. Straw 740 lbs.	−9 −3	
35	As above ...	As in 31, omitting calcic sulphate ..	Ville I and III.	Do. ...	As above ...	Grain 810 lbs. Straw 980 lbs.	+17 +29	

Note.—The asterisk indicates that the experiments formed one of a series on special manure plots

Total area under experiment on Nagpur Experimental Farm during the year 1888-89.

Kharif.	Acres.	Rabi.	Acres.
Cotton (Upland Georgian)	8·29	Wheat	25 44
Juar	7·31	Linseed	10 62
Sorgho	1·56	Gram	3 35
Guinea-grass	1·49	Sugarcane	0 20
Tur	4·05		
Mung	0·24		
Popat (white)	0·13	Total Rabi ...	39 61
Japan pea	0·55		
Til	1·47		
Castor	2·08		
Chillies	0·29		
Total Kharif ...	27·46	Grand Total ...	67·07